COUNTDOWN ACID RAIN

GOVERNMENT REVIEW OF THE TENTH PROGRESS REPORTS (JANUARY 31, 1991) BY ONTARIO'S FOUR MAJOR SOURCES OF SULPHUR DIOXIDE

Ontario Ministry of the Environment

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INTRODUCTION

Four major corporate sources (Inco, Falconbridge, Algoma at Wawa, and Ontario Hydro) produce over 80% of Ontario's sulphur dioxide (SO_2) emissions. Each source is required by Ontario's Countdown Acid Rain regulations to report every six months on the progress made to reduce SO_2 emissions.

The Countdown program was formulated in 1985 and placed an annual SO_2 emissions cap of 885 kt (new limit 877 kt) on the province, to be in place by 1994. Specific reductions in SO_2 began in 1986 and culminate in a cap totalling 665 kt for the four major sources by 1994. In the case of Ontario Hydro, limits were also placed on the combined emissions of SO_2 and nitric oxide (NO) and an interim cut of 35% limiting SO_2 to 240 kt and acid gases (SO_2 + NO) to 280 kt was also imposed for 1990-1993. The Countdown limits are in addition to standards imposed to ensure good ambient air quality. Annual legal limits are summarized in Table 1.

Table 1
Sulphur Dioxide Legal Limits
(thousands of tonnes per year)

	1985	1986	1994
Inco nickel/copper smelter, Sudbury	728	685	265
Falconbridge nickel/copper smelter, Sudbury	154	154	100
Algoma iron ore sintering plant, Wawa	285	180	125
Ontario Hydro fossil fuel power plants, province-wide	390	370	175

Each of the four sources has met the legal limits to date and each has submitted detailed plans for implementing its reduction program, as required by the regulations. The sixth set of company progress reports, received in December 1988 and January 1989, set out the detailed methods and schedules for meeting the emission limits of the Countdown regulations. They were accepted by the government.

Implementation progress reports are required every six months. This document summarizes the contents of the tenth set of semi-annual company reports and the government response. Previous semi-annual reports are available from the Public Affairs and Communications Services Branch, Ontario Ministry of the Environment, 135 St. Clair Avenue West, Toronto, Ontario, M4V 1P5, (416) 323-4321.

COMPANY REPORTS AND GOVERNMENT RESPONSES

The progress reports were reviewed by a technical work group drawn from the Ontario Ministries of Environment, Northern Development and Mines (for the metallurgical companies) and Energy (for Ontario Hydro).

The implementation phase of the Countdown program is now well under way, and each of the four regulated companies reports its progress and current status in relation to the 1994 emission limits. A summary of the individual reports, and the Ontario government's response follow.

INCO LIMITED

Regulation 660/85 requires a reduction in SO_2 emissions from Inco's nickel/copper smelter complex in Sudbury to no more than 265 kt for any year after 1993, compared to the current limit of 685 kt per year. The company was also required to examine the feasibility of going beyond the fixed limit of 265 kt by 1994 to a level of 175 kt at some future date. Consequently, the feasibility of continuing technical advances remain a concern of Inco and the government. The government previously accepted Inco's position that a specific interim reduction was not feasible because of the nature of the major process changes being undertaken in order to meet the 1994 emission limit.

The company's Tenth Progress Report indicates that:

- Implementation of Sulphur Dioxide Abatement Project is continuing but currently running two months behind schedule as a result of labour disruptions of spring and early summer in 1990. The company has put in place a comprehensive long term recovery program to minimize slippage of original schedule. The Mill Rationalization and the Smelter SO_2 Abatement Program construction phase are 15% and 12% behind schedule respectively.

- Financial commitments of about $430 million have been made. This is approximately 87% of the total estimated project cost.

- Expenditures to-date totals some $260 million, about 53% of the project costs.

- Engineering for the Milling Rationalization project is complete and that for Smelter SO_2 Abatement Program is 80% complete and on schedule.

- In December 1990 some 310 engineering and construction management personnel were working on the project. In addition to this more than 900 trade personnel were involved in on-site contract work.

- The Mill Rationalization project is scheduled for completion in March 1991 and is unchanged in scope.

- Inco has expressed some concern in this report over obtaining the final Certificate of Approval (C of A) for the Mills Rationalization and Smelter Phase I Programs for timely start-up.

- Fugitive SO_2 emissions are expected to be 80% lower in 1994 than those at present due to changes in smelting technologies.

Details on ongoing smelter development programs related to Sulphur Dioxide Abatement Project were provided in the main body of Inco's 10th semi-annual report.

The government review concluded that Inco continues to meet the requirements of Regulation 660/85. The Ministry has noted the company's concern regarding issuance of the final Certificates of Approval referred to in the company's report and would like to assure Inco that the Ministry has assigned specific staff in Approvals Branch to handle these applications in order to avoid delays and therefore it should not be a problem. The Ministry staff recently met with Inco and Inco's consultants to resolve some of the concerns related to Inco's new acid plant application for Certificate of Approval. Inco's 1990 SO_2 emissions were 617.4 kt. Some of the points of concern noted by the reviewers are listed below:

- The Ministry would like to reiterate its request made to Inco in the 9th Government Summary and Analysis Report (January 1991) to provide in future semi-annual progress reports a simple process flowsheet and sulphur balance diagrams.

- The Countdown Technical Support Group would like to see a revised implementation schedule on the company's SO_2 Abatement Program Phase in future semi-annual progress reports.

<u>Mill Rationalization</u>

- The Ministry is pleased to know that the Mill Rationalization project is ready to go into operation shortly.

Smelter

- Since a number of development programs and process plant commissioning (e.g., injection of solid through tuyeres in bessemer matte converting, #2 flash furnace for bulk concentrate, MK flash converting) are slated for 1991, the Ministry would like Inco to report developments in these areas in future progress reports.

SO_2 Emissions

- The Ministry wishes to be apprised of the anticipated new SO_2 ground level concentration based on estimated SO_2 emissions from the three stacks listed in Inco's earlier progress reports. Relevant dispersion programs to carry out this study were provided by the Ministry to Inco several months ago.

- The Ministry has responded to Inco on "Fugitive Emission Abatement at Inco's Copper Cliff Smelter" report in January 1991 listing a number of concerns with venting SO_2 emissions from the existing 450' stack and is awaiting Inco's response.

Acid Plant

- The Ministry still has some concern over the periodic monitoring of sulphur trioxide concentration in acid plant tail gases and suggests that Inco should evaluate the feasibility of using the new commercially available sulphur trioxide (SO_3) monitor based on wet chemistry.

FALCONBRIDGE LIMITED

Regulation 661/85 requires Falconbridge to reduce the SO_2 emissions from its Sudbury nickel-copper smelter complex to no more than 100 kt for every year after 1993. The regulation also requires Falconbridge to evaluate the possibility of reducing SO_2 emissions below the 100 kt per year level. Promising areas for further reductions have been identified by the company and Ministry technical staff.

The company's report, covering the period July to December 1990, notes that:

- The Company has achieved operational capability in its smelter to meet the 1994 annual SO_2 emission limit of 100 kt at full smelter production capacity. This development for the year 1990 is three years in advance of the 1994 requirements of Regulation 661/85.

- The technical and operational improvements to the smelter have enabled the company to further lower its SO_2 emissions from 6.5 tonnes in 1975 to 1.9 tonnes in 1990 per tonne of nickel production.

- During 1990, capital projects amounting to $2.5 million were completed and similar expenditures will be incurred in 1991 for capital projects from the total budgeted costs of $32 million for the SO_2 abatement program.

- Falconbridge 1990 SO_2 emissions were 69.8 kt at 85% of the smelter design capacity of 88 million pounds of nickel per year.

The Countdown Technical Support Group concluded that the company's 10th semi-annual progress report met the requirements of the Ontario Regulation 661/85 and the SO_2 abatement program implementation is progressing as per schedule. The reviewers are pleased to know that Falconbridge is successful in achieving the Regulation limit of 100 kt SO_2 emissions three years ahead of schedule. The Countdown Technical Support Group is further pleased to note that the company's January 31, 1991 news release indicated that Falconbridge plans to lower SO_2 emissions to 75 kt/yr on a voluntary basis before 1998.

Some of the points of concern noted by the reviewers are listed below:

- The Ministry would still like the company to include a simple sulphur balance based on best estimates of SO_2 releases and capture in various smelting operations in future semi-annual progress reports.

- The reviewers believe that modifications to fluid-bed roasters dust collection system may result in higher particulate emissions when acid plant is not operating. Therefore, information on dust loading and characterization of particulate matter (e.g., trace metals) released from the main stack will be required to assess adverse environmental impact if any under similar situations.

- Falconbridge's research and development efforts in improving pyrrhotite rejection in mineral concentration circuit are commendable. However, the company is reminded that the use of new chemical depressants in these areas would require the Ministry's prior approval to ensure that there are no concerns related to effluent quality.

- The Countdown Technical Support Group would appreciate a review of the company's current capital expenditure program to ascertain that future program is analogous with the reported current successes in meeting Regulation 661/85 SO_2 emissions limit.

ALGOMA SINTER PLANT, WAWA

The Algoma Steel Corporation operates an iron ore sinter plant at Wawa, about 270 km northwest of Sault Ste. Marie. Regulation 663/85 limits current SO_2 emissions from the operation to 180 kt per year, dropping to no more than 125 kt per year for every year after 1993..

In August 1986, the sinter production capacity at Wawa was down-sized by about half. When combined with a change to lower sulphur level in feed, this has resulted in much reduced SO_2 emissions.

The company's 10th semi-annual progress reports confirms that the company will meet the 1994 SO_2 emission limit by the reduction of sinter capacity.

The 10th semi-annual progress report also indicates that:

- Algoma's 1990 SO_2 emissions were 42.7 kt based on mass balance.
- The company forecasts 1991 SO_2 emissions to be about 57 kt at a sinter production capacity of 1.22 million tonnes.
- The Countdown Technical Support group concluded that the company continues to meet the requirements of Regulation 663/85.
- The company has also indicated that 1990 SO_2 emissions were substantially lower due to labour problems at various company plants in the second half of 1990.
- The Countdown Technical Support Group notes that the corporation is currently facing severe financial problems and the future of Wawa sinter plant operation is somewhat uncertain.

ONTARIO HYDRO

Regulation 281/87 requires Ontario Hydro to meet interim 1990 emission limits as well as imposes a tighter limit for 1994 and beyond. Separate limits are set for SO_2

alone and for the sum of SO_2 plus NO (nitric oxide), as shown in Table 2.

Table 2
Ontario Hydro's Sulphur Dioxide and Acid Gas Emissions Limits

Period	Regulated Limits	
	SO_2	SO_2 + NO
	(kilotonnes per year)	
1986 to 1989	370	430
1990 to 1993	240	280
1994 and future	175	215

The corporation reports that preliminary 1990 emission estimates were 196 kt, and 50 kt for SO_2 and NO, respectively.

The corporation reports expenditures during 1990 of $313 million on measures contributing to the reduction of acid gas emissions, which included:

- $25.3M for flue gas desulphurization for Lambton Thermal Generating Station.
- $47.8M for flue gas conditioning at Lambton, Nanticoke, and Lakeview thermal generating stations, required to allow burning of low sulphur coal.
- $0.5M million for combustion process modifications.
- $47.8M for low sulphur coal premium, which was partially for acid gas control.
- $136.8M for control actions made up of $91.0M for electricity purchases used to limit coal fuel burning and $45.8M for other control actions including increasing the lignite burn at Atikokan and Thunder Bay thermal generating stations and reduced electricity export sales.
- $1.8M for research and development.

The corporation has placed an order for the first pair of SO_2 scrubbers at Lambton thermal generating station. The scrubbers will use a limestone slurry system and are to be installed by 1994. Ontario Hydro received approval for its plan to install scrubbers at its coal or fossil fuel

fired stations, under the Environmental Assessment Process, in 1989.

The tenth semi-annual progress report indicates that the flue gas conditioning (FGC) equipment with sulphur trioxide (SO_3) and ammonia (NH_3) conditioning agents has been completed for all units at Lambton and Nanticoke and is working satisfactorily. The dual FGC equipment ($SO_3 + NH_3$) is expected to go into service for units 1, 2, 5 and 6 at Lakeview thermal generating stations in 1991 and 1992. In the interim period, a low cost "Calgon" FGC system has been installed at Lakeview thermal generating station on units 1, 2, 7 and 8 to reduce derating due to opacity while operating on low sulphur coal.

The report also indicates that Ontario Hydro imported 7.7 TWh of electricity from Canadian and U.S. utilities as a short term control measure to ensure that the provincial acid gas emission limits would not be exceeded in 1990. Ontario Hydro does not plan to use this type of control action in 1991.

Some other points noted by the reviewers are listed below:

- The Countdown Technical Support Group concluded that Ontario Hydro has been meeting the requirements of Regulation 281/87.

- Ontario Hydro's imports of electricity to comply with the acid gas emissions limit is of some concern. This is not a true acid gas control measure and should not be relied upon as a means of complying with the regulation.

- The Countdown Technical Support Group asks that Ontario Hydro should report changes to its acid gas control plan and alternatives as they come up to the Ontario Ministry of the Environment in the semi-annual progress reports.

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